DOCUMENT RESUME

ED 286 472 IR 012 805

AUTHOR Masturzi, Elio R.
TITLE Differing Structures in Development of Interactive Media Based Learning.
PUB DATE Jun 86
NOTE 7p.; Paper presented at the International Conference on Development of Effective Interactive Instruction Materials (Arlington, VA, June 18-19, 1986).
PUB TYPE Reports - Descriptive (141) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Authoring Aids (Programing); Business Administration Education; *Computer Assisted Instruction; *Courseware; Developed Nations; Elementary Secondary Education; Foreign Countries; Higher Education; Industrial Training; Media Research; Microcomputers; Multimedia Instruction; Videotape Recordings
IDENTIFIERS *Laboratory of Interactive Ed Technologies (Italy); *Software Design

ABSTRACT

This paper first provides a brief overview of the Italian educational system and the diffusion of computer-assisted instruction (CAI) within the schools and industry, and then it reviews the activities of the Laboratory of Interactive Educational Technologies (LIET) in the Department of Production Engineering at the University of Naples (Italy). Five goals of LIET are listed: (1) to evaluate possibilities and advantages of using technology and equipment in teaching; (2) to assemble and improve interactive multimedia teaching systems; (3) to analyze, improve, and utilize the available authoring systems; (4) to produce CAI courseware in various fields; and (5) to promote awareness and use of CAI throughout the educational and business sector. LIET's hardware resources and courseware production activities in the areas of banking, manufacturing, and education are then described, as well as a LIET study which found that students are receptive to and benefit from CAI techniques. A look at future plans for courseware development, improvement of authoring languages, and teacher training concludes the paper. (MES)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

UNIVERSITÀ DEGLI STUDI DI NAPOLI
DIPARTIMENTO DI INGEGNERIA DEI MATERIALI E DELLA PRODUZIONE
Piazzale Tecchio - 80125 Napoli - Telex INGENA I 722392

ED286472

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
This document has been reproduced as received from the person or organization originating it.
Minor changes have been made to improve reproduction quality.
Points of view or opinions stated in this document do not necessarily represent official OERI position or policy

LIET

Laboratory of Interactive Educational Technologies

ELIO R. MASTURZI

Department of Production Engineering - University of Naples

DIFFERING STRUCTURES IN DEVELOPMENT OF INTERACTIVE MEDIA BASED LEARNING

Paper presented at International Conference on
"Development of Effective Interactive Instruction Materials"
Organised by SALT (Society for Applied Learning Technology)
Arlington , Virginia (USA) - June 1986

IR012 805

BEST COPY AVAILABLE

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY
Elio Masturzi

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

COPY SHEETS
For 8½ x 11 sheet
Type page overall - 6¾ x 9½
This sheet to be reduced to
77% of it's present size

DIFFERING STRUCTURES IN THE DEVELOPMENT OF INTERACTIVE MEDIA BASED LEARNING

Prof. Elio R. Masturzi
Department of Production Engineering
University of Naples
Naples, Italy

ABSTRACT

This paper first examines the diffusion of Computer Based Education in Italy, and then it delves into the activities of the Laboratory of Interactive Educational Technologies of the Department of Production Engineering at the University of Naples (Italy). The laboratory utilizes various interactive learning systems; some are concerned with the use of interactive methods in the industrial sector, and the other multi-media interactive systems have been developed to produce banking,manufacturing and management coursewares. Videotape units have been widely utilized with all coursewares.

INTRODUCTION

Nowadays, the usefulness of multi-media interactive technologies in the educational field has been recognized worldwide. During a conference in June of 1985, the Presidents and Prime Ministers of the European Economic Community recognized "Educational Technology" as being one of the most valuable amongst the ten they regarded as being the most crucial to the future development of the EEC.

Only by means of CBE based techniques will it be possible to meet the growing needs expressed by the communities of the future.

My department at the University of Naples, the Department of Production Engineering, has been working in the CBE field since 1984.

In spite of our relatively brief history, we have developed programs that have allowed us to be forerunners in the CBE field in respect to the University's other departments.

In 1985 we inaugurated our Laboratory of Interactive Educational Technologies (LIET) of which I am the manager. LIET has the following goals:

1) To evaluate the possibilities and advantages of using technology and equipment in teaching.
2) To assemble and to improve interactive multi-media teaching systems.
3) To analyze,improve and utilize the available Authoring Systems (A.S.).
4) To produce CBE coursewares in various fields.
5) To spread awareness and employment of CBE throughout the educational and business sector.

To pursue these goals, LIET has installed five computerized work stations with five to six researchers utilizing them.

Before illustrating LIET developed programs, and the results we have obtained, a brief overview of the state of the art of CBE in the schools, universities, and companies of Italy is called for.

CBE IN ITALIAN SCHOOLS AND UNIVERSITIES

The Italian school system is divided into three levels:

1) Elementary School: Five years, for children six to ten years old.
2) Junior High School: Three years.
3) High School: (Regular curriculum or Professional Institutes) Five years.

The school system is made up for the most part of publicly run schools which are financed by the state. There is also a vast private school system, for all three levels, but it differs from the public school system in that the high schools offer almost always a college preparatory curriculum rather than a technical one. The first two levels are compulsory for all children.

The Italian University system is exclusively state run- with respect to some rare exceptions, private universities in Italy do not exist.

The teaching is done by the University, research is conducted by the University and by the CNR (National

COPY SHEETS
For 5½ x 11 sheet
Type page overall - 6¼ x 9½
This sheet to be reduced to 77% of it's present size

Research Council). The university degree takes four to six years, depending on the direction taken.

In 1985, the Board of Education initiated a three year program aimed at encouraging the use of the computer as a teaching aid.

Previously, the computer had been considered by the school system to be solely something which could be taught, but which could not teach.

In Junior and Senior High School, hardware and programming were being taught, while in the Universities, the first steps were being taken to promote the computer as a teaching instrument.

The government program aimed at the use of the computer as a teaching instrument in schools of every level encountered numerous obstacles.

The reasons for this were principally the following:

1) Absence of a CBE "mentality" in the instructors.
2) Absence of coursewares.

Instructors of non computer related fields, furthermore, do not have a sufficient mastery of the computer, which, therefore, prohibits them from realizing how it can be used in the educational field.

However, some instructors in the various " hard science " fields, (mathematics, physics, chemistry, etc.) have begun to develop CBE programs.

Nevertheless, the usage of these programs is, for the most part,still in the experimental stages, due mostly to lack of knowledge on the part of the instructors in regards to computer science.

This lack of knowledge, coupled with the lack of a CBE "mentality" has consistently prevented the production and marketing of usable courseware.

There are very few coursewares in existence specifically thought out and designed with CBE in mind- those that there are having been constructed by a "cut and paste" method culled from previously existing textbooks.

Sadly enough, there are few "scripts" in existance written specifically for CBE course ware.

A paragon can be made between this situation and that of the early days of the cinema- since scarce material was available for the then brand new media of communication, old theatre scripts were used for movie-making purposes.

To overcome these obstacles, the Board of Education has singled out forty four "pilot" schools in Italy, who will be used as the base of a nationwide plan for Computer Based Education.

In these schools, CBE coursewares covering a wide spectrum of arguments (technical and non technical) are being developed and examined, as are CBE methodologies and training courses for instructors.

My department is arranging a special course on "Interactive Educational Technologies" which aims to train the instructors in the use of CBE techniques.

CBE IN ITALIAN INDUSTRY,PUBLIC AND PRIVATE

CBE methodologies are used in a much more profound way in Italian industry, but even in this sector it is not sufficiently widespread.

Not many Italian companies approach CBE for training purposes, with the exceptions perhaps of the electronics, motor, aircraft, and banking industries.

The coursewres haven't got general contents, and are focused on specific problems of the company in question, thus limiting it's usefulness to other firms.

With this in light, the distributors and producers of the Italian computer industry do not have extensive "courseware catalogues", in either the industrial or educational sector.

LIET PROGRAMS AND EXPERIENCES

At the moment, the University of Naples is developing a large program concerning the use of the computer for educational purposes. This program involves many of the Universitie's colleges, such as Engineering, Computer Science, Physics, etc.

The College of Engineering, which has it's own CBE program, has about 7,000 incoming students each year, they attend courses concerning seven different areas of concentration; mechanical,civil, electronic, electric, aereonautical, naval and chemical engineering.

My department, the Department of Production Engineering, which works in the field of Management Science and Plant Design, first employed the Universitie's computer facilities to solve

COPY SHEETS
For 8½ x 11 sheet
Type page overall - 6¾ x 9½
This sheet to be reduced to
77% of it's present size

problems concerning operational research or plant design.

In 1983, we began to focus our attention on the possibility of using the computer for educational purposes.

We needed first to choose between using the University's main frame facilities (Univac and IBM) or to use independant facilities.

We opted for the latter, and the low cost of personal computers allowed our department to purchase a set of Apple and IBM personal computers, along with various peripherals.

After this, we bagan to work towards two main objectives:
1) Educational Models construction
2) Coursewares production

In the first program, we produce sample models of liquid tanks, assembly lines, antromorphic robots, etc., all controlled through use of the personal computer. We have also developed educational courseware for these models, by which students can simulate the effects of pre-programmed variations of the operative parameters (temperature, pressure,position, etc.) on these sample models. In addition to this, the students can practice programming a computer that controls plant units.

The second program, started on a later date, was based on the results of a pre-program developed in cooperation with some computer companies and other foreign or Italian researchers. The largest contribution, however, has been on the part of Professor Gaylen B. Kelley from Boston University.

THE CBE FACILITIES RESOURCES

In developing the coursewares production program, we were faced with the choice of developing them in the mainframes enviornment, or in the personal computers enviornment. We chose the personal computer for the following reasons: The Italian Board of Education has suggested that all Italian learning institutions use personal computers instead of mainframes or minis, every time in which it is technically feasible. The future of CBE in the Italian school system is clearly in the P.C. enviornment and the results of our research point out that the general trend of Italian industry in the use of CBE and CBT is towards the use of the P.C. also.

For the reasons above mentioned, we installed in our Laboratory of Interactive Educational Technologies (LIET) only P.C. units and we supplied them with Authoring Languages and Systems specifically developed for personal computers.

Hardware Elements Installed

Peripheral units connected with our IBM and Apple computers are:
1) Graphic printers, now laser
2) Graphic Tablet and Plotter
3) Color Monitors
4) T.V. Camera and Videotape unit

We prefer to connect the P.C.' with a videotape unit instead of a video disk unit because the videodisk unit is too difficult and expensive for us. The production of a videodisk in Italy is complicated and expensive. We have connected a professional videotape unit (Sony or Panasonic) by an interface card with the CPU of a personal computer and we have adapted the standard software to drive the videotape unit. The set's efficiency is more than sufficient for our teaching and training needs. The higher access time of videotape is not important to us since we don't need to pick up a single image, but a long sequence of images. The production of videotaped sequences of images is fast, cheap, and easy.

Authoring Systems Used

We have tested many P.C. Authoring Systems available in Italy, such as PILOT, Monitor, SEF-PC,SDX,SDY, and McGraw. On the basis of these tests, we have decided to focus our efforts on Pilot and McGraw A.S.'s.

We chose the latter for it's editing power and the former for the possibility it offers to the coursewares developer to integrate the PILOT softwares with numerous external Basic softwares. We employ PILOT to develop coursewares which need calculation routines or which use simulation procedures.

PRODUCED COURSEWARES

Our LIET has produced coursewares for experimental purposes as well as for professional use.

In cooperation with two schools, we have produced coursewares dealing with set theory, English language learning and chemistry.

For professional utilization my researchers and I are currently work-

COPY SHEETS
For 8½ x 11 sheet
Type page overall - 6¾ x 9½
This sheet to be reduced to
77% of it's present size

ing on a series of coursewares concerned with banking and manufacturing arguments.

In the banking field, we are producing a set of coursewares for training bank employees in the use of the bank's information system. The set is divided into ten units, each treating a specific bank procedure. Each unit consists of about five hundred different screens, recorded on eight to ten inch floppy disks.

We make wide use of computer graphic images and simulation procedures in these kinds of coursewares.We have also found it very useful to introduce into the coursewares units the simulation of IBM 3270 units. This is the peripheral unit which bank personel should be using.

In manufacturing, we are producing coursewares in two different sectors:

1)Plant and Machine assembly and /or maintenance.
2)Management Science

In the first sector, we are developing two experimental coursewares for the training of personel of two manufacturing companies. Specifically, it deals with the assembly, disassembly and maintenance of units such as a dynamometric brake and an N.C. machine center.

Recently, we have entered into collaboration with one of the largest Italian manufacturers of equipment for educational purposes. This company produces models of industrial manufacturing systems (i.e.machine centers, industrial manipulators and robots,oleodynamic or pneumatic equipment, etc.) that are employed in the technical schools for educational and training purposes.

We are developing coursewares concerned with the explanation of how to use this educational equipment,as well as how to check up on the level of learning reached by the students.

We have found it very useful to employ the videotape units along with a CBE or CBT courseware. To develop these types of coursewares, we preferably use "editing oriented" Authoring Systems because the "text" part is prevailing.

The second industrial sector in which my laboratory is working on is in Management science, which is also the area in which my Department specifically operates. It develops courses on plant organization,industrial automation,production planning and control and managerial decisions and accounting.

On the basis of our experiences in the teaching of this field and in CBE methodologies, we have developed coursewares on many arguments such as economic order quantity, batch production, demand forecasting, etc. For these we obviously used "calculation and simulation" oriented A.S.'s.

On the basis of these results I decided to try producing an integrated "Teaching Unit" specifically conceived with CBE principles in mind.

I chose Managerial Accounting as the argument of the Teaching Unit(TU).

First, I wrote a new version of my book which deals with the problems of costs analysis, costs behavior, Break Even Point, cost/profit centers, standard costs and budget planning and control. In writing this new version, I obviously kept in mind the CBE program I wished to achieve.

Then, I wrote a CBE text integrated with the arguments in the book. I then developed a courseware, with PILOT A.S., integrated with the textbook.

The courseware allows students to review the concepts covered in the book, to quiz themselves on what they've learned and to practice by themselves the many quantitative exercises the coursewares offers. The courseware is largely based on calculations and simulations techniques.

Lastly, I have developed a set of software programs dealing with some of the more frequently encountered Managerial Accounting problems such as the calculation of Break Even Point, Contribution Margin, Gross Margin, or the development of a Cost Center Budget. With these softwares, the learner is able to approach and solve problems he encounters in the workplace. All the theoretical concepts which the student learned with the textbook and the CBE courseware are included in the softwares design.

In my opinion, the use of an integrated T.U. such as the one above mentioned, can indeed be very useful.

In the first place, it combines the advantages of both the traditional learning methodologies and the new learning technologies.

In the second place, the existence of a software specifically developed with the criteria learned by the student in mind, allows him to immediately apply the concepts he has learned

in solving real problems.

RESULTS OBTAINED AND FUTURE PLANS

I have done some experimentation concerning the use of interactive ducational technologies during my academic course.

I divided my students into two sub-sets, both approximately at the same academic level.

Some topics were presented to one sub-set in the traditional way, and the same arguments were presented to the other sub-set by means of interactive educational techniques.

At the end of the course, we submitted the students to some tests in order to check upon the effects CBE methodologies, the learning rate, and what they had achieved.

The test results showed that all students were very receptive to CBE methodologies, and likewise received great benefits from the use of them.

Nevertheless, the teacher has not quite been replaced yet. CBE methodology may only turn out to be a teaching aid

On the basis of these experimentations, my Department has decided to improve our efforts in the production of CBE courseware. We think it better to develop coursewares with large practice and simulation content, in this way, they will represent an even larger part of the practical applications theory in our future academics courses.

My laboratory is also working to improve the editing of some Authoring Languages in order to speed up the writing of coursewares.

The LIET is also involved in a future project concerning the development of courses that explain to school teachers the benefits which can be garnered from CBE methodologies, and it also shows them how to use the multi-media technologies for teaching purposes. This should be done in collaboration with the Italian Board of Education.

ABOUT THE AUTHOR

Elio R. Masturzi is currently the Professor of Production Tecniques at the Department of Production Engineering at the University of Naples in Italy.

He is also responsible for the Laboratory of Interactive Educational Technologies at the above mentioned University. He also works as a consultant in the field of management science and CBE applications. He holds a Ph.D in Chemical Engineering from the University of Naples

He was Assistant Professor in the Technology Institute at the University of Bari (Italy) and Associate Professor in the Industrial Plants Institute at the University of Naples.

He has developed many professional courses in the above mentioned fields for private companies as well as for government organizations.

Professor E.R. Masturzi has also published over fifty articles, and is author of three books dealing with management science and personal computing teaching applications.

COPY SHEETS
For 8½ x 11 sheet
Type page overall - 6½ x 9½
This sheet to be reduced to
77% of it's present size